PROGRAMMABLE UNIVERSAL SCOPE METER

User's Manual

S240x_E200707_R01

Programmable
Universal Scope

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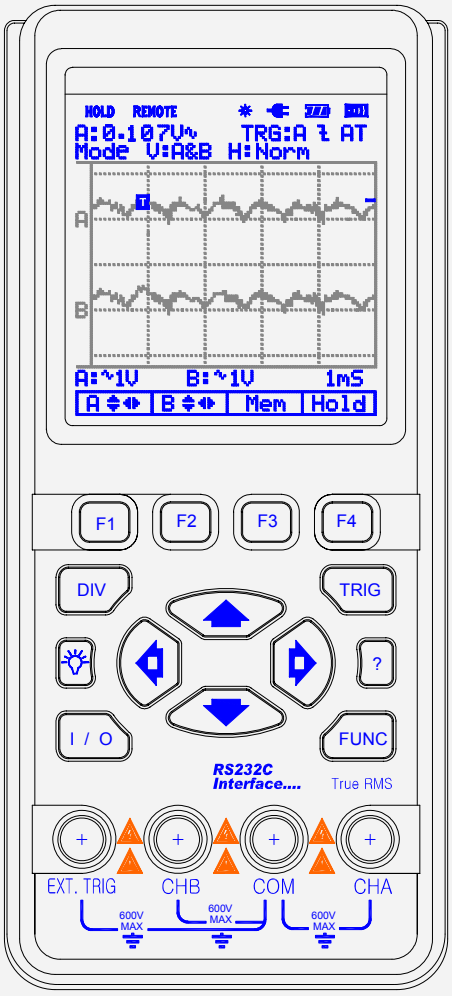
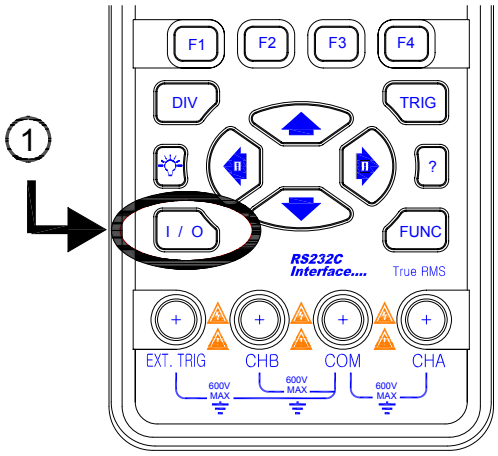
1. Easy Manual



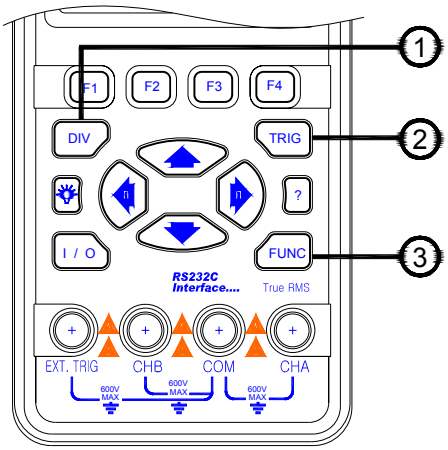
Front View

1.1. Turning on and off



① Pressing this button for 1 to 2 seconds will turn the unit on.
Pressing this button again will turn the power off.

1.2. Division, Trigger and Function key

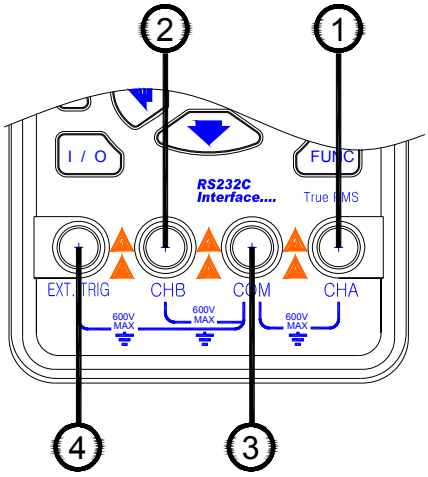


① **Division key**:
Adjusts vertical division or Horizontal division.

② **Trigger key**:
Adjusts Trigger level.
Selects Single shot mode.
Selects trigger setup.

③ **Function key**:
Selects Scope Setup.
Selects general setup.

1.3. Input Terminals



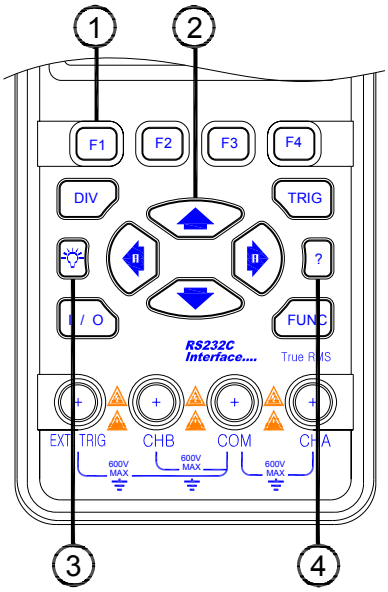
① **Channel A**:
You can always use the red channel A for all single input measurements possible with the meter.

② **Channel B**:
For measurements on two different signals you can use the channel B together with the Channel A.

③ **Common**:
You can use the black common as single ground for low frequency measurements and for ACV, DCV, Ohm, Continuity measurements.

④ **External trigger**:
The EXT.TRIG input accepts external trigger signals.

1.4. Command, Arrow, Backlight & Information key



① **Command keys**:
These four keys are command buttons.
They are labeled F1-F4. These keys will have various functions.

② **Four arrow keys**:
These keys serve as the primary means of navigating the instrument's menus and operating displays.

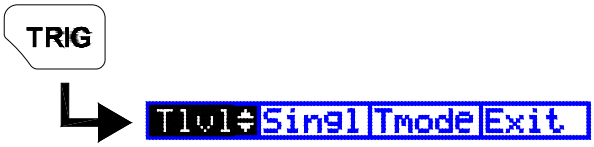
③ **Display back light**:
Press this button to turn on the backlight. To turn the back light off, press this button again.

④ **Information key**:
General information for the test tool is available.

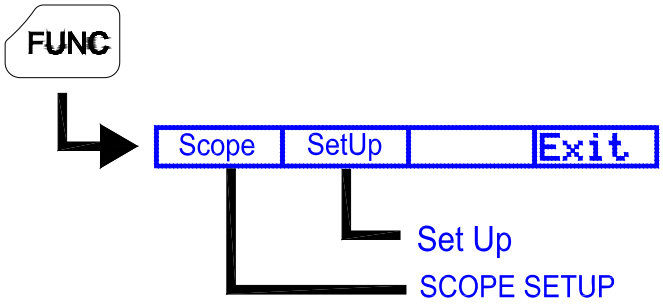
1.5. Primary Menu Map

Default Menu

Division Menu

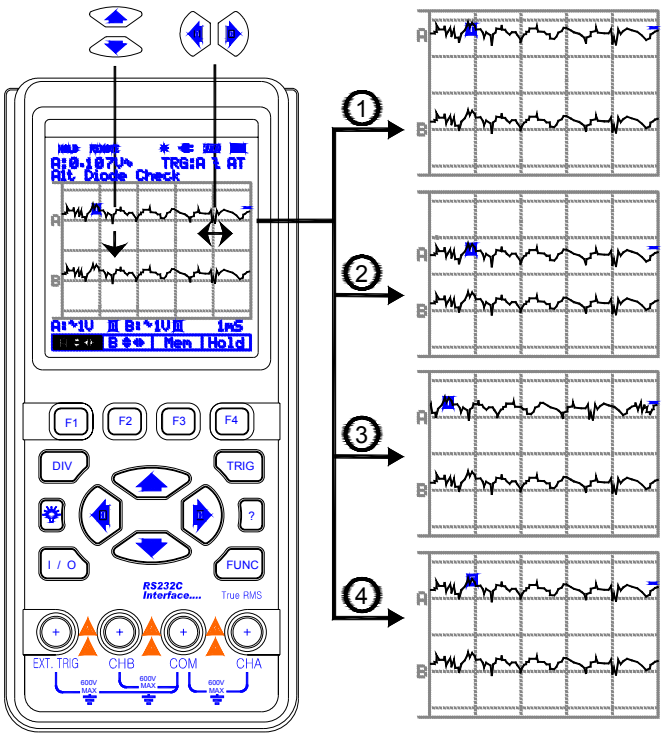


Trigger Menu



Function Menu

1.6. Positioning the waveform on the screen



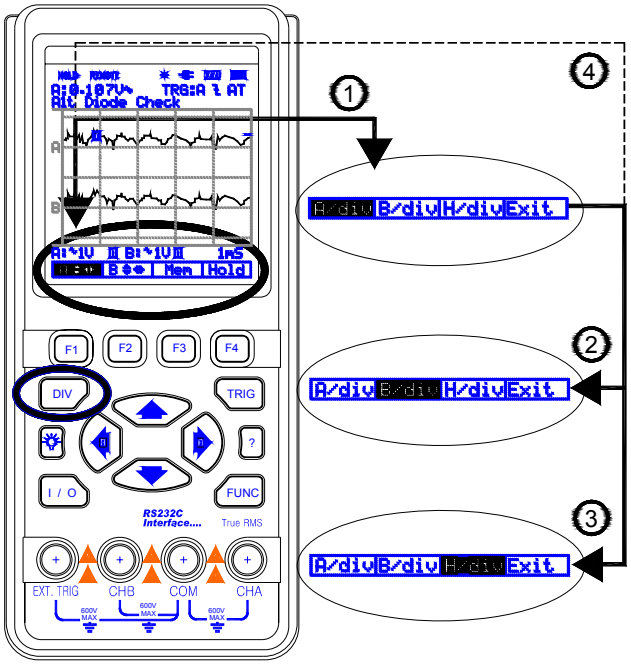
① Pressing moves the waveform up.

② Pressing moves the waveform down.

③ Pressing moves the waveform left.

④ Pressing moves the waveform right.

1.7. Division key map



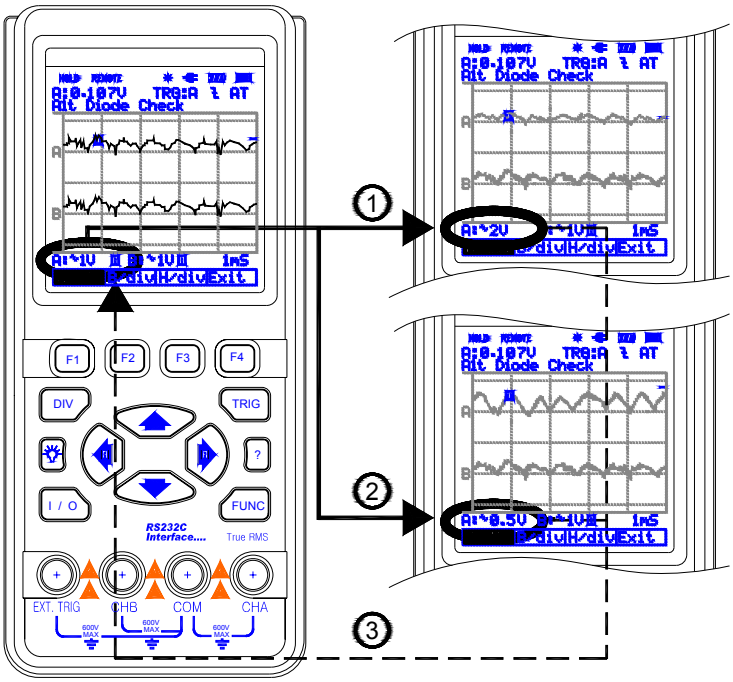
① Pressing DIV calls up the default division menu.

② Press F2 to control the Channel B Vertical Division.

③ Press F3 to change the Horizontal Division.

④ Press F4 to exit.

1.8. Changing Vertical (A/div or B/div) division

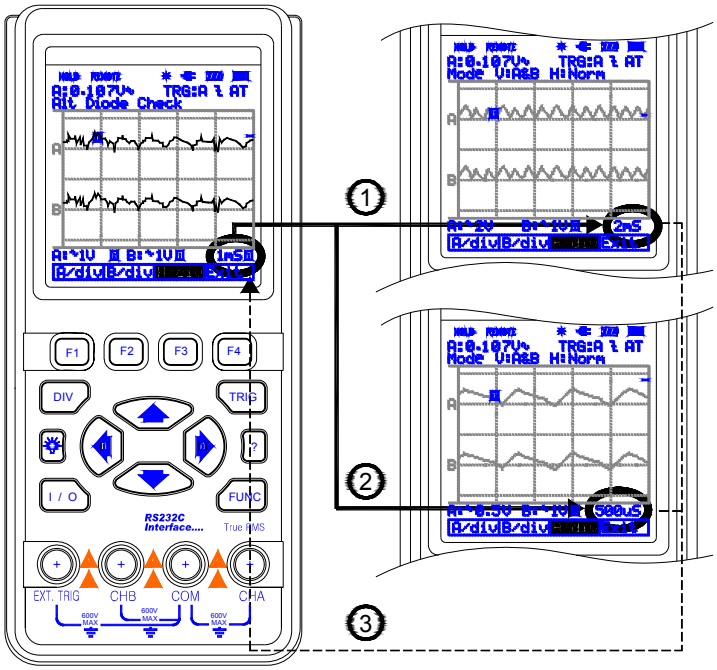


① Pressing button increases CHA vertical division (A/div).

② Pressing button decreases CHA vertical division (A/div).

③ Pressing or key will change Div from MANUAL to AUTO(A).

1.9. Changing Horizontal division

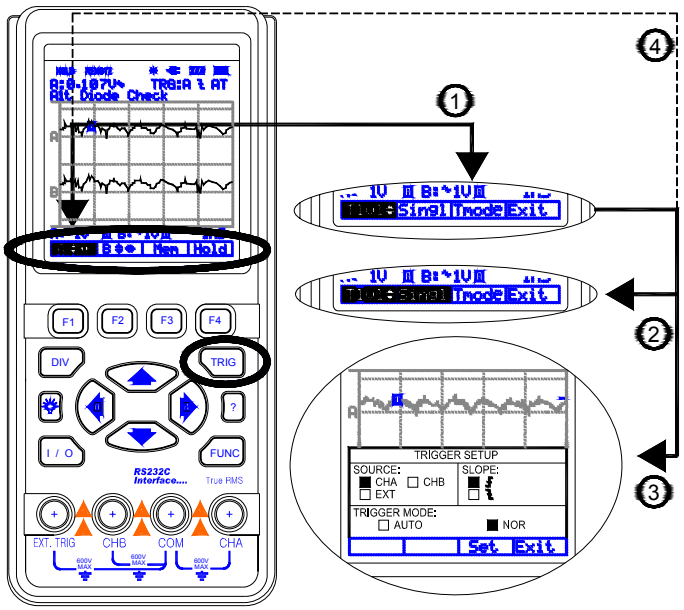


① Pressing button increases Horizontal division (H/div).

② Pressing button decreases Horizontal division (H/div).

③ Pressing or key will change Div from MANUAL to AUTO(A).

1.10. Trigger key map



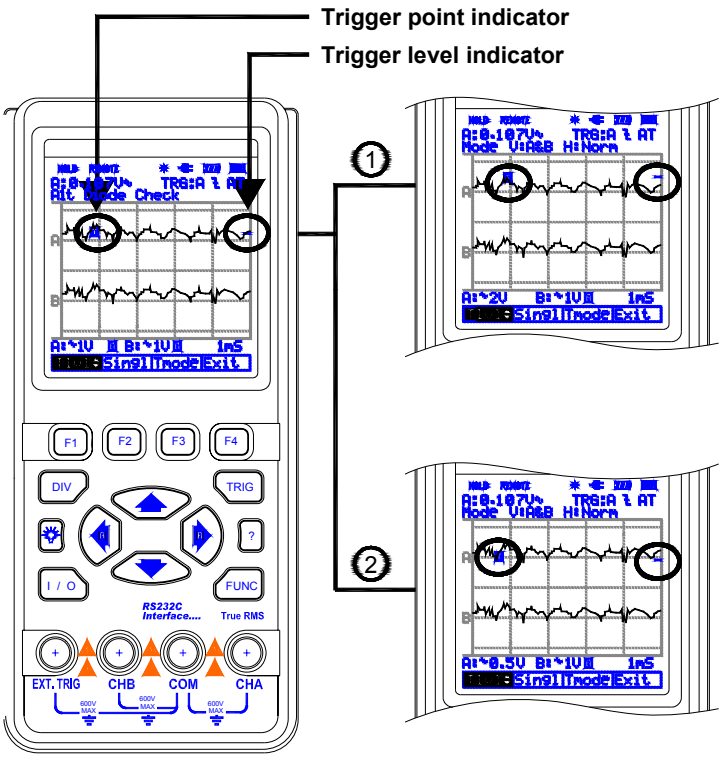
① Press TRIG key to display the TRIGGER default menu.

② Press F2 key for Single shot mode.

③ Press F3 key for TRIGGER SETUP.

④ Press F4 to exit.

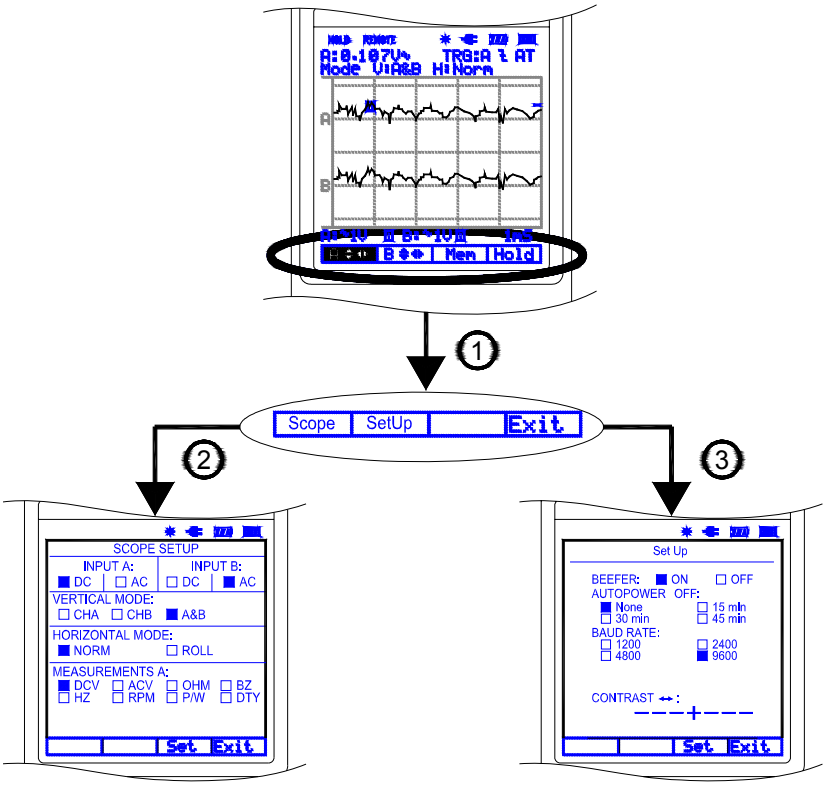
1.11. Trigger level control



① Pressing button increases the Trigger level.

② Pressing button decreases the Trigger level.

1.12. Function key map



① Press FUNC key to display the FUNCtion default menu.

② Press F1 key for SCOPE SETUP.

③ Press F2 key for General SETUP.

④ Press F4 to exit.

2. Introduction

2.1. Main Features

This Programmable Universal Scope Meter offers enhanced features that similar type test instruments on the market today don't have.
All the functions are designed to be very convenient to use. You can quickly get used to working with this METER and the great many functions integrated inside. This instrument features:

No	Features
1	PC interface for transferring measurement data and waveform.
2	**Dual Channel** and Auto Calibration.
3	**Automatic setting** for horizontal and vertical division.
4	DC to **5MHz**(2405), **1MHz**(2401) oscilloscope band width
5	Built-in auto ranging **True-RMS** digital MultiMeter
6	Auto ranging
7	Data hold and run mode.
8	Back light display and Low battery indication.
9	Display Type: Super-Twist 132 x 128 pixels.
10	Designed to comply with safety standard for UL3111, CSA C22.2 No.1010-1

2.2. Unpacking the Test Tool Kit

The following items are included in your test tool kit.

■ **STANDARD**

#	Description <Cont.>
1	Scope Meter <1>
2	Li-ion Battery (installed) <1>
3	AC Power & Rechargeable Adaptor <1>
4	Test Leads <2>
5	CD Users Manual (this book) <1>

■ **OPTION**

#	Description <Cont.>
1	Carrying case <1>
2	Holster <1>
3	PC interface Cable <1>
4	Scope Meter Software for Windows <1>

Note:
When new, the rechargeable Li-ion Battery is not fully charged.
The accessories may be changed to improve the product quality without notifying the customers.

2.3. Specification

2.3.1. General Specifications

1) Operational Temperature:
   0°C to +50°C (+32°F to +122°F) at a relative humidity 75% or less

2) Storage Temperature:
   -20°C to +60°C with a relative humidity of 75% less

3) Temperature Coefficient:
   0.1 x (Specified Accuracy) per °C for temperature <18°C to >28°C

4) Max. Voltage between any Input and Ground: DC or AC 600Vrms

5) Basic DC Accuracy: 0.3%

6) Band width: 5MHz(2405), 1MHz(2401)

7) Meter AC Band width: 20kHz

8) Power Supply: Li-ION Battery 3.7V

9) Battery Life Time:
   4 Hours without Backlight on,
   3 Hours with Backlight on.

10) Battery Charge Time: About 3 Hours

11) Battery Charge:
   Class-2 transformer, Input: 120-240V AC 50/60Hz, Output: 5V DC 1A

12) Display Type: Super-Twist 132 x 128 pixels

13) Equipment Dimensions:
   90 mm (width) x 195 mm (depth) x 40 mm (height)

14) Equipment Weight: 1.0 lbs. (480g) approx. without Holster

2.3.2. Technical Specification

1) Oscilloscope Function

(1) Horizontal

Sample Rate	50 MS/s (Single CH mode), 25 MS/s (Dual CH mode)
Record Length	512 single shot mode, 256 in all modes
Sample / Division	25
Modes	Single shot, Roll, Normal
Accuracy	0.01%
Sweep Rate	1uS to 5S in 1, 2, 5 sequence

(2) Vertical

Bandwidth		S2401: 1MHz, S2405: 5MHz
Resolution		8 Bit
Channels		Dual
Coupling		AC, DC
Input impedance		1 MΩ
Accuracy		3%±1Pixel
Max. Input Volts		DC or AC 600Vrms
Volt / Division	S2401	0.5 V to 500V in 1, 2, 5 sequence
	S2405	50 mV to 500V in 1, 2, 5 sequence

(3) Triggering

Type	CHA, CHB, External
Coupling	AC, DC
Slope	Rising (↑) or Falling (↓) edge
Internal Trigger Sensitivity	2 / 20 Division

(4) Waveform Memory

Waveform Memory	16 Shots

2) Digital MultiMeter Function

DC V

Model	Scope V/Div	DMM Range	Resol.	Accuracy	Imped.
S2405	50m, 0.1, 0.2	500mV	0.1mV	±(0.3%+3)	1 MΩ
S2401 S2405	0.5, 1, 2	5V	0.001V		
	5, 10, 20	50V	0.01V		
	50, 100, 200	500V	0.1V	±(0.5%+5)	
	500	1000V	0.1V		

AC V

Model	Scope V/Div	DMM Range	Resol.	Accuracy (Hz)			Imped.
				50~450	0.45k~5k	5k~20k	
S2405	50m, 0.1, 0.2	300mV	0.1mV	±(0.75%+5)	±(2%+5)	±(3.5%+5)	1 MΩ
S2401 S2405	0.5, 1, 2	3V	0.001V				
	5, 10, 20	30V	0.01V				
	50, 100, 200	300V	0.1V				
	500	750V	0.1V	±(1.2%+5)	±(2.5%+5)	N/A	

The Voltage for more than 200V in Frequency range 5kHz to 20kHz: Not Specification

OHM

Scope Div	DMM Range	Resolution	Accuracy	Over Load Protection
1 kΩ	5 kΩ	0.001 kΩ	±(0.5%+5)	600V DC or AC rms
10 kΩ	50 kΩ	0.01 kΩ		
100 kΩ	500 kΩ	0.1 kΩ		
1 MΩ	5 MΩ	0.001 MΩ	±(0.75%+10)	

Continuity Buzzer

Test Voltage	Threshold	Over Load Protection
1.7V	100 digits	600V DC or AC rms

Frequency

Range	Resolution	Accuracy	Overload protection
100 Hz	0.01 Hz	±(0.05%+5)	600V DC or AC rms
1 kHz	0.0001 kHz		
10 kHz	0.001kHz		
100 kHz	0.01kHz		
1 MHz	0.0001MHz		
10 MHz (2405)	0.001MHz		

The guaranteed range is below 5 MHz.

RPM

Range	Resolution	Accuracy
240 - 60,000	1 RPM	±(0.05%+5)

Pulse Width

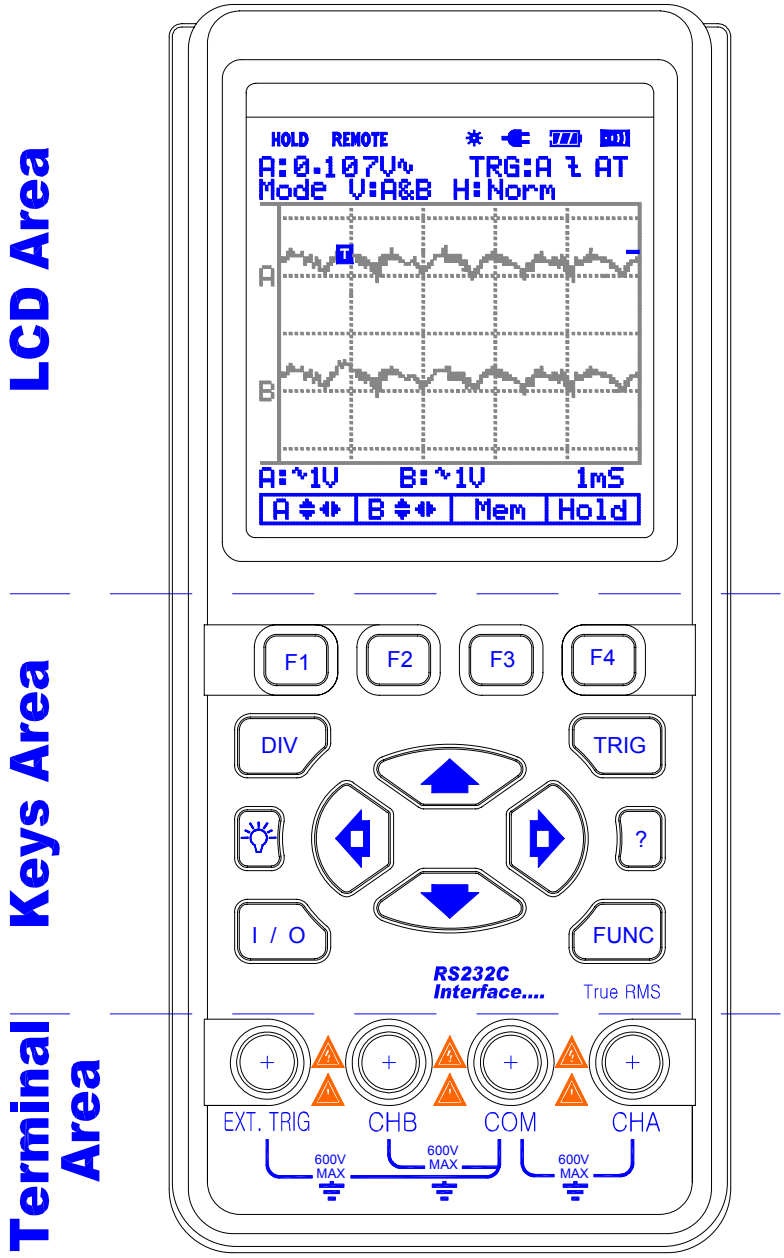
Range
2uS-500mS (Pulse Width > 2uS)

% Duty

Range
25% - 75%

3. Product Description

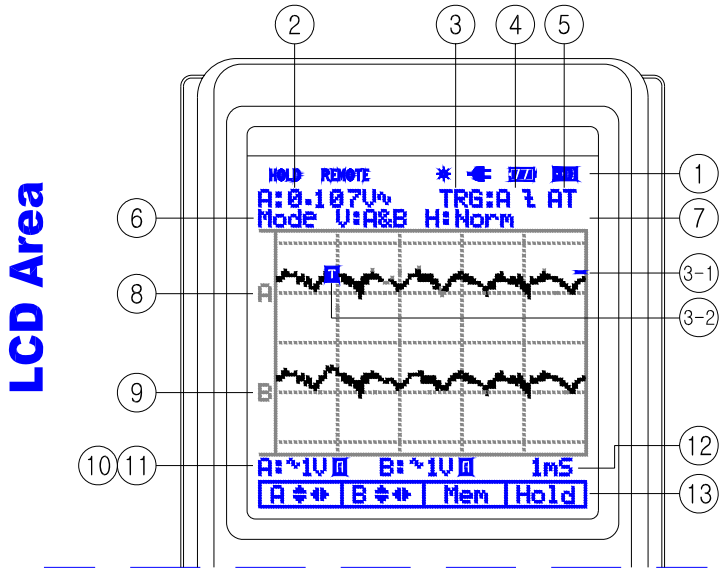
In this chapter, the LCD, front panel buttons, controls and terminal are described.



[Front View]

3.1. LCD Area

The screen is divided into five areas: Indicator area, Reading area, Waveform area, Setting area and Menu area. Refer to Figure below.



[LCD Display]

1) Indicator
   - HOLD: Freezes display in the LCD
   - REMOTE: USB Output indicator
   - BACK LIGHT(✱): Back light indicator
   - BUZZER(▬): Buzzer indicator
   - Charging LINE(⚡): Charging Battery indicator
   - BATTERY(▭): Low battery indicator

2) Primary Numerical Field (DMM Function)
   Displays the numerical readings. Because only input A is on, you will see the input A readings only.

3) Trigger selection
   - Channel A, B and External

   3-1) Trigger level indicator
   3-2) Trigger Cursor

4) Trigger Slope
   - Rising or Falling edge

5) Trigger mode: Normal or AUTO

6) Channel mode status
   Vertical mode: ▪ CHA ▪ CHB ▪ A&B
   Horizontal mode: ▪ Normal ▪ Roll

7) Memory Address
   - 0 to 15

8) Live Scope Display (Channel A)
Displays real time waveforms and freezes held captures.

9) Channel B

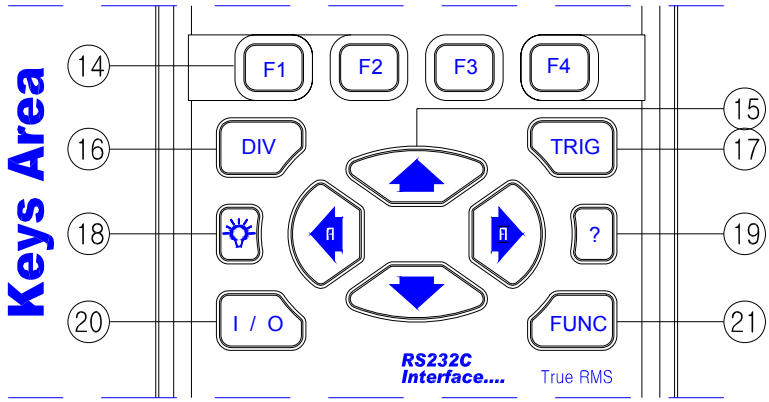
10) Channel A Vertical Division

11) Channel B Vertical Division

12) Horizontal Division (Time base)

13) Command Menu Field

3.2. Keys Area

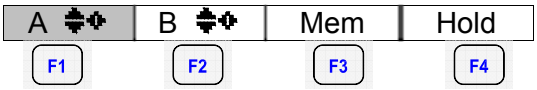


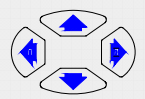
[Keys Area]

14) F1 F2 F3 F4 Command Menu keys

All Keys are command buttons. They are labeled F1~F4. These keys will have various functions.

① Default (Command Menu)



15)  Arrow keys

Use the black arrow keys to highlight the item.

①		The cursor to be changed is moved to up with this button. Pushing the button will increase the value or position.
②		The cursor to be changed is moved to down with this button. Pushing the button will decrease the value or position.
③		The cursor to be changed is moved to left with this button. Pressing this button changes Vertical division or horizontal division from MANUAL to AUTO.
④		The cursor to be changed is moved to right with this button. Pressing this button changes Vertical division or horizontal division from MANUAL to AUTO.

16) DIV Division key

Set Channel A, B and Horizontal Division

① **DIV**

A/div	B/div	H/div	Exit
F1	F2	F3	F4

17) TRIG Trigger key

Set Trigger level, Single mode and Setup

① **TRIG**

Tlvl	Singl	Tmode	Exit
F1	F2	F3	F4

② **F3**

TRIGGER SETUP	
SOURCE: ■ CHA □ CHB □ EXT	SLOPE: □ ■
TRIGGER MODE: □ AUTO ■ NOR	
	Set / Exit
F1 F2	F3 F4

18) Back light key

Activates Back Light for the LCD
Toggles backlight ON and OFF.

19) Information key

Provides meter model number, firmware version, serial number, calibration date and manufacture date

20) Power switch

Turns the instrument ON or OFF.

21) Function Key

Set Scope, Auto Scope and Setup of the METER

① **FUNC**

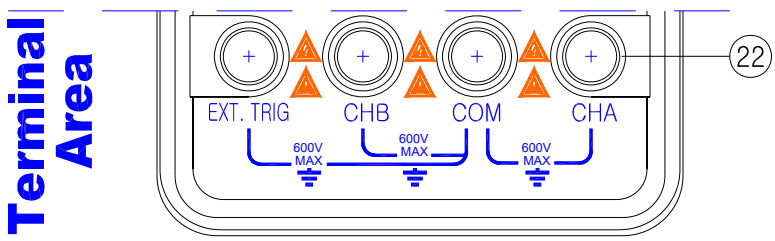
Scope	SetUp		Exit
F1	F2	F3	F4

▪ Scope Setup

① **FUNC➔F1 (Scope)**

SCOPE SETUP			
INPUT A:		INPUT B:	
■ DC	□ AC	■ DC	□ AC
VERTICAL MODE:			
□ CHA	□ CHB	□ A&B	
HORIZONTAL MODE:			
■ NORM	□ ROLL		
MEASUREMENTS A:			
■ DCV	□ ACV	□ OHM	□ BZ
□ HZ	□ RPM	□ P/W	□ DTY
		Set	Exit
F1	F2	F3	F4

3.3. Terminal Area



[Terminal Area]

22) Terminals description

Look at the bottom of the METER. The METER provides 4 input jacks.

① CHA: Channel A

You can always use the red channel A for all single input measurements possible with the Meter.

② COM: Common

You can use the black COMMON as single ground for DCV, ACV, Ohm, Continuity, frequency and RPM measurements.

③ CHB: Channel B

For measurements on two different signals you can use the channel B together with the red channel A.

④ EXT. TRIG

External trigger.

4. Using the METER

4.1. Safely Using the Test Tool

4.1.1. Attention

Carefully read the following safety information before using the test tool.

4.1.2. Safety Precautions

Specific warning and caution statements, where they apply, will be found throughout the manual. A Caution identifies conditions and actions that may damage the test tool. A Warning identifies conditions and actions that pose hazard(s) to the user.

Symbols used on the test tool and in this manual are explained in the next table.

⚠ **Warning**

To avoid electrical shock, use only specific power supply, Model (Power Adapter used as a Battery Charger).

⚠	See explanation in manual
⚠	Dangerous Voltage
⧈	Double Insulation (Protection Class)
⏚	Earth (Ground)
∼	Either AC or DC
⎓	DC – Direct Current
∼	AC – Alternating Current
▭	Fuse

4.1.3. Powering the METER

Follow the procedure to power the Meter from a standard ac outlet.

①		Power Adaptor is inserted in to AC outlet.
②		Power Adaptor➔ the Meter.
③	I / O	Turn the Meter on by pressing this button for about 3 seconds.

The meter powers up in its last setup configurations.

4.1.4. Changing Backlight

After power-up, the screen has a high bright display.
To save battery power, the screen has an economic brightness display when operated on the battery pack (no power adapter connected).

To change the brightness of the display, do the following:

①		Brighten the backlight.
②		Dim the backlight again.

The high brightness increases when you connect the power adapter.

Note

Using dimmed display lengthens maximum battery power operation time by about one hour.

4.1.5. Making Selections in a Menu

Subsequently follow steps ① to ⑤ to open a menu and to choose an item.

①	FUNC	Open the FUNCTION menu. Scope | SetUp | | Exit
②	F1	Open the **Scope Setup** menu. **SCOPE SETUP** INPUT A: ■ DC □ AC INPUT B: ■ DC □ AC VERTICAL MODE: □ CHA □ CHB ■ A&B HORIZONTAL MODE: ■ NORM □ ROLL MEASUREMENTS A: ■ DCV □ ACV □ OHM □ BZ □ HZ □ RPM □ P/W □ DTY | | Set | Exit
③	◀ ▲ ▶ ▼	Use the arrow keys to highlight the item.
④	F3	Select the proper item.
⑤	F4	Exit.

Key: FUNC ➔ F1 ➔ ◀ ▲ ▶ ▼ ➔ F3 ➔ F4

1) To choose a **Frequency** measurement for **CHA**, do the following:

①		Plug the black test lead into the COM input jack.
②		Plug the red test lead into the CHA input jack.
③	FUNC	Open the FUNCTION menu. Scope | SetUp | | Exit
④	F1	Open the Scope Setup menu. **SCOPE SETUP** INPUT A: ■ DC □ AC INPUT B: ■ DC □ AC VERTICAL MODE: □ CHA □ CHB □ A&B HORIZONTAL MODE: ■ NORM □ ROLL MEASUREMENTS A: ■ DCV □ ACV □ OHM □ BZ □ HZ □ RPM □ P/W □ DTY | | Set | Exit
⑤	◀ ▲ ▶ ▼	Highlight Hz (□ Hz)
⑥	F3	Select Hz (■ Hz)
⑦	F4	Exit.

Key: FUNC → F1 → ◀▶ → F3 → F4

Observe that Hz is now the main reading.

4.1.6. Freezing the screen

You can freeze the screen (all readings and waveforms) at any time.

		Default (Command Menu) Display: A ⇕ | B ⇕ | Mem | Hold
①	F4	Freeze the screen. Highlighted Hold appears at the bottom of the Command Menu area. A ⇕ | B ⇕ | Mem | Hold
②	F4	Resume your measurement A ⇕ | B ⇕ | Mem | Hold

4.1.7. Changing the Graphic Representation

1) Changing the vertical division

①	DIV	Open the Command Menu. A/div | B/div | H/div | Exit
②	F1 or F2	Change the vertical division. (CH A or CH B)
③	▲	Increase the vertical division Div is changed to manual mode.
④	▼	Decrease the vertical division. Div is changed to manual mode.
⑤	◀ or ▶	Change Div from Manual mode to AUTO mode.

2) Changing the Time Base

①	DIV	Open the Command Menu. A/div | B/div | H/div | Exit
②	F3	Change the Horizontal division. A/div | B/div | H/div | Exit
③	▲	Increase the number of periods. Div is changed to manual mode.
④	▼	Decrease the number of periods. Div is changed to manual mode.
⑤	◀ or ▶	Change Div from Manual mode to AUTO mode.

4.1.8. Acquiring the Waveform

①	FUNC	Open the FUNCTION menu. Scope | SetUp | | Exit
②	F1	Open the Scope Setup menu. **SCOPE SETUP** INPUT A: ■ DC □ AC INPUT B: ■ DC □ AC VERTICAL MODE: □ CHA □ CHB □ A&B HORIZONTAL MODE: ■ NORM □ ROLL MEASUREMENTS A: ■ DCV □ ACV □ OHM □ BZ □ HZ □ RPM □ P/W □ DTY | | Set | Exit

Recording Slow Signals over a Long Period of Time

③		Highlight ROLL MODE.
④	F3	Set ROLL MODE.
⑤	F4	Exit.

Key: FUNC → F1 → → F3 → F4

The roll mode function supplies a visual log of waveform activity and is especially useful when you measure lower frequency waveforms.

Note

ROLL MODE operates when the horizontal division is between 1s and 5s

Selecting AC-Coupling for INPUT A

③		Highlight AC for INPUT A.
④	F3	Accept AC-coupling for INPUT A.
⑤	F4	Exit.

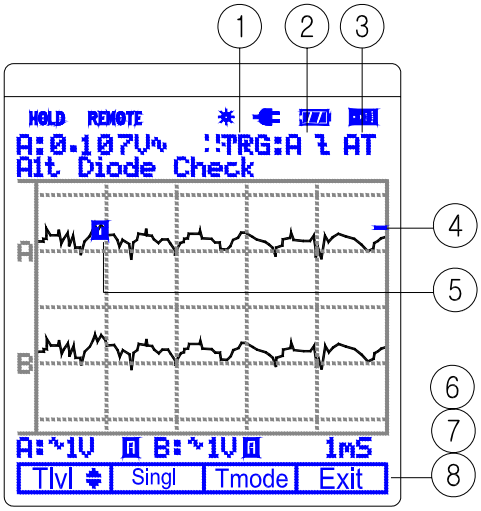
Key: FUNC → F1 → → F3 → F4

Use AC-coupling when you wish to observe a small AC signal that rides on a DC signal.

5. Triggering on a Waveform

Triggering tells the METER when to begin displaying the waveform. You can select which input signal should be used, on which edge this should occur and you can define the condition for a new update of the waveform.

The right-top line of the LCD identifies the trigger parameters being used. Trigger icons on the screen indicate the trigger level and slope.



Screen with all Trigger Information

(1) Trigger Channel: Channel A or B
(2) Slope: rising or falling
(3) Trigger mode: Trigger setting mode (Auto or Normal)
(4) Trigger Level indicator
(5) Trigger Cursor
(6) Command Menu: Trigger level
(7) Command Menu: Single shot
(8) Command Menu: Trigger mode (Setup)

5.1. Setting Trigger level (on NORmal trigger mode)

①	TRIG	Open the Trigger menu Tlvl ⬍ | Singl | Tmode | Exit
③	▲ ▼	Adjust the Trigger Level continuously. Observe the trigger icon on the second time division line indicates the trigger level.
③	F4	Exit.

Key: TRIG → ◀▲▶▼ → F4

5.2. Making a single acquisition

To catch single events, you can perform a single shot. (One time screen update.) To set up the test tool for a single shot on the input A waveform, do following:

* Connect the probe to the signal to be measured.

①	TRIG	Open the default Trigger menu Tlvl ⬍ | Singl | Tmode | Exit
②	F2	Highlight Singl (SINGLE SHOT) Tlvl ⬍ | Singl | Tmode | Exit Test tool performs a single shot. (One time screen update)
③	F2	Return to normal Trigger mode. Tlvl ⬍ | Singl | Tmode | Exit

Key: TRIG → F2 → F2

5.3. Setting Trigger mode (Tmode)

①	TRIG	Open the Trigger menu Tlvl ⇕ | Singl | Tmode | Exit
②	F3	Open the Trigger Setup **TRIGGER SETUP** SOURCE: ■ CHA □ CHB □ EXT SLOPE: □ ⨍ ■ ⨍ TRIGGER MODE: □ AUTO ■ NOR Set | Exit
③	◀ ▲ ▶ ▼	Highlight the ITEM you want.
④	F3	Set the ITEM.
⑤	F4	Exit.

Key: TRIG → F3 → ◀ ▲ ▶ ▼ → F3 → F4

5.4. Setting AUTO Trigger Level

For quick operation, use the AUTO trigger mode to trigger on nearly all signals automatically. To optimize trigger slope manually, do the following:

①	TRIG	Open the Trigger menu Tlvl ⇕ | Singl | Tmode | Exit
②	F3	Open the Trigger Setup **TRIGGER SETUP** SOURCE: ■ CHA □ CHB □ EXT SLOPE: □ ⨍ ■ ⨍ TRIGGER MODE: □ AUTO ■ NOR Set | Exit
③	◀ ▲ ▶ ▼	Highlight AUTO.
④	F3	Set AUTO.
⑤	F4	Exit.

Key: TRIG → F3 → ◀ ▲ ▶ ▼ → F3 → F4

5.5. Setting Normal Trigger mode

		Highlight NOR.
④	F3	Set NOR.
⑤	F4	Exit.

		Adjust the Trigger Level continuously. Observe the trigger icon on the second time division line indicates the trigger level.

Key: TRIG → F3 → → F3 → F4

5.6. Setting Trigger Slope

③		Highlight ⊼ or ⊽.
④	F3	Set ⊼ or ⊽.
⑤	F4	Exit.

	⊼ or ⊽.	Trigger on either positive Slope or negative Slope of the chosen waveform.

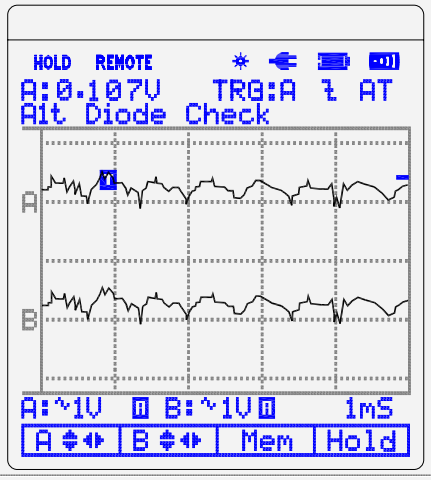
Key: TRIG → F3 → → F3 → F4

6. Storing and Recalling Screens

The meter can store setups and waveforms to memory for later recall. Sixteen (0-15) setup and waveform memories are available.

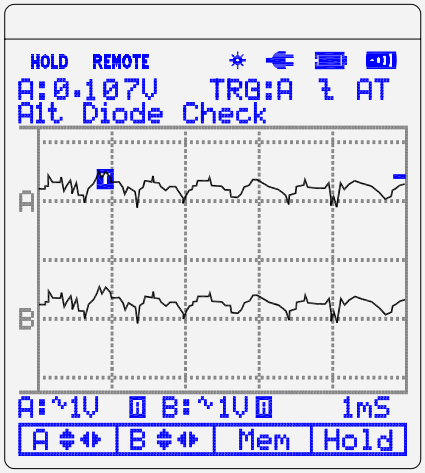
6.1. Storing Screen

To store a screen, do the following:

①	Default	
②	F3	Open the memory (Mem) menu Sto ⬍ | Rcl ⬍ | R/wfm | Exit Memory field (M;0) appears at the top-right corner of the display area.
③	▲ ▼	Select the memory address you want to store in.
④	F1	Store the actual screen

6.2. Recalling Screen

To recall a screen, do the following:

①	Default	
②	F3	Open the memory menu Sto ⬍ | Rcl ⬍ | R/wfm | Exit
		Memory field (M;0) appears at the top-right corner of the display area.
③	▲ ▼	Select the memory address you want to recall from.
④	F2	View the saved screen.

The image is presented as a picture that can no longer be changed.

7. Remote Interface Operations

This section explains how to install the USB device driver.
If you have any questions after reading this information, please contact your local service representative.
Remote Interface is Optional.

7.1. USB HID Device Installation

7.1.1. System Requirements

Desktop or Laptop computer with:
1) The IBM PC or Compatible Computer.
2) The Windows operating system: Refer to the Readme file in CD-ROM.
3) The CD-ROM Drive
4) USB Port for Connection with Instrument
This is restricted to devices that have USB ports and for which the manufacturer of the computer guarantees the operation of the USB port.

7.1.2. Operating System

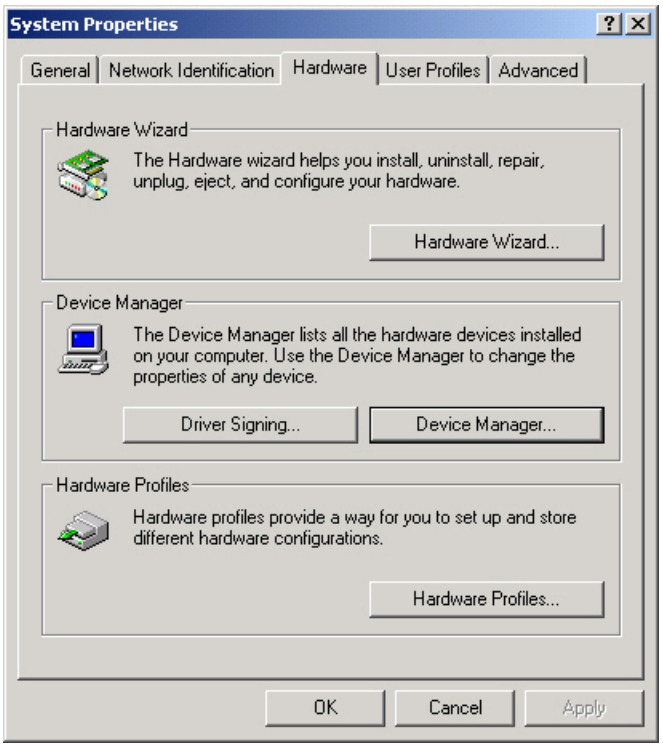
- Microsoft Windows 2K/XP/2K3 or above

7.2. Verifying the computer's USB port

1) Ensure that the USB HandyScope is plugged in.
2) Pressing I/O key for 1 to 2 seconds will turn the unit on.
3) Right click on the My Computer icon and open [Properties].
4) Select the [Hardware] tab and click the [Device Manager] button to open [Device Manager].
5) Check that [Human Interface Device] is displayed.
* If [Human Interface Device] is not displayed, the USB device driver cannot be used.

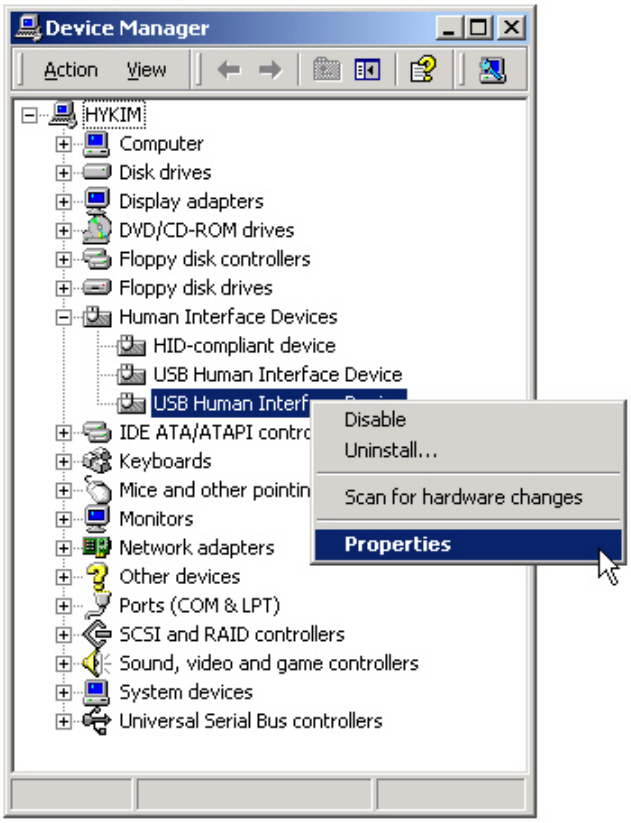
7.2.1. Installing the HID Device

1) Plug in the 4 Pin type into the USB port on the Meter, and connect the USB connector type on the other end of the cable to the host USB port in your PC.
2) Pressing I/O key for 1 to 2 seconds will turn the unit on.
3) The Windows operating system displays "Found New Hardware" and automatically installs the Human Interface Device (HID) driver. HIDs do not require a custom USB driver. Support for HIDs is built into Windows.
4) Review the status of the HID using the Device Manager.
5) Right click on My Computer to open the System Properties - Hardware dialog. Then click on Device Manager.



[Figure 1: System Properties]

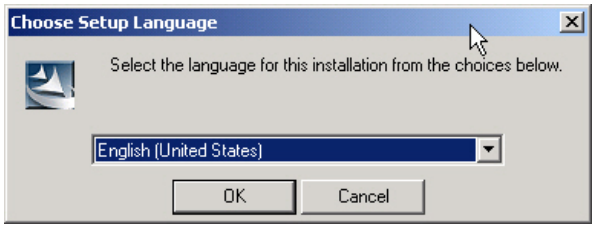
6) Right click on the Human Interface Device to open the Properties dialog which contains the description and status of the HID device.



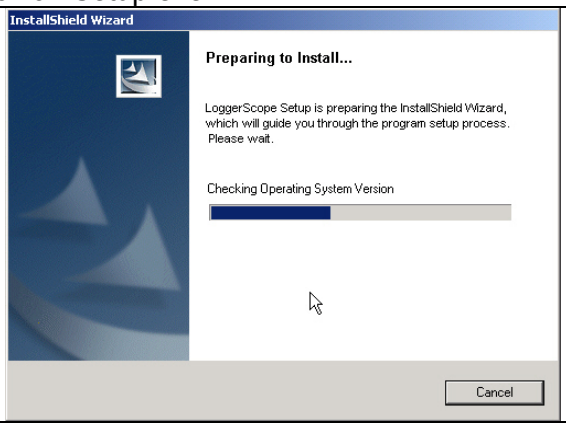
[Figure 2: Device Manager]

7.3. To install Windows Application Software

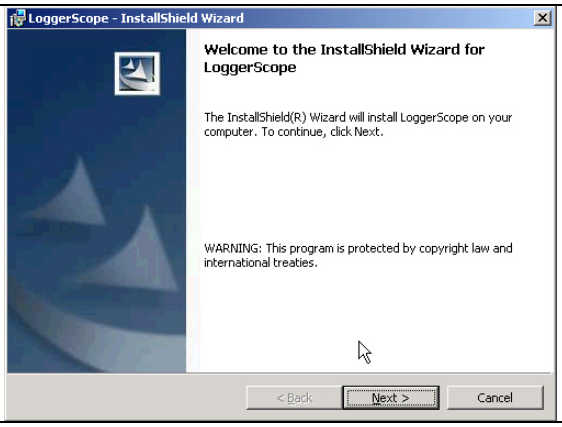
1) Insert the HandyScope software installation guide CD into the CD-ROM drive of your PC.
2) Open Windows® Explorer and double-click the CD-Rome drive.
3) Auto Run or Windows users can simply double click on Setup.exe'.



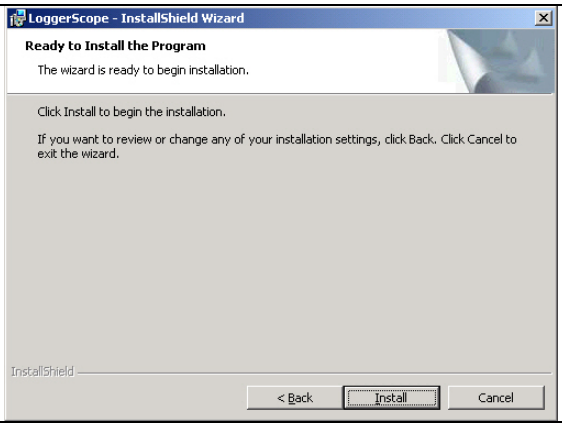
[Step 1: Choose Setup Language]



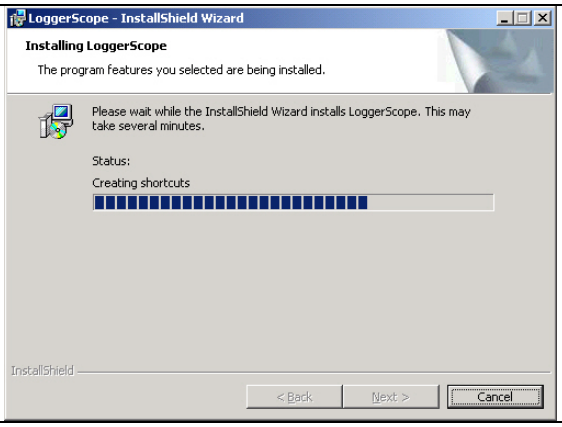
[Step 2: Preparing to Install]



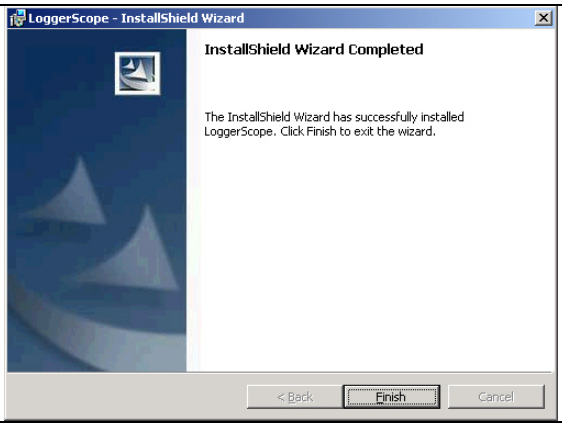
[Step 3: Welcome to the… HandyScope]



[Step 4: Ready to Install the Program]



[Step 5: Installing HandyScope]

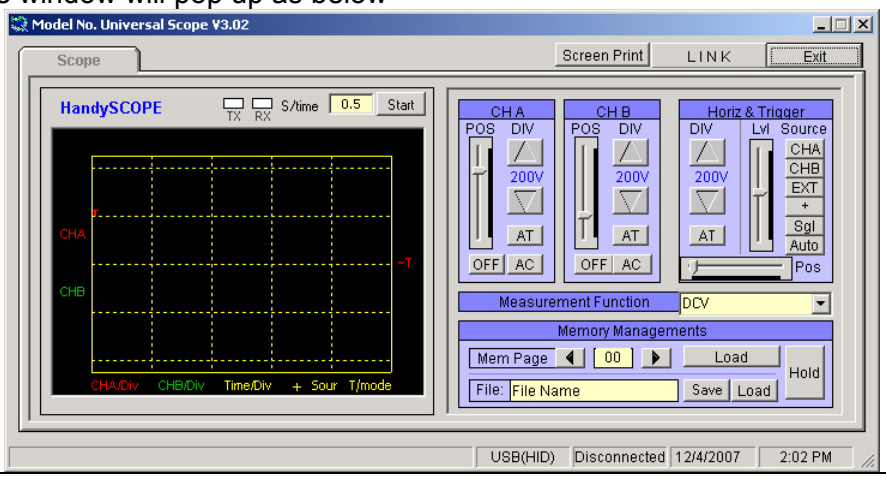


[Step 6: Installed Wizard Completed]

7.4. Running the Application Software

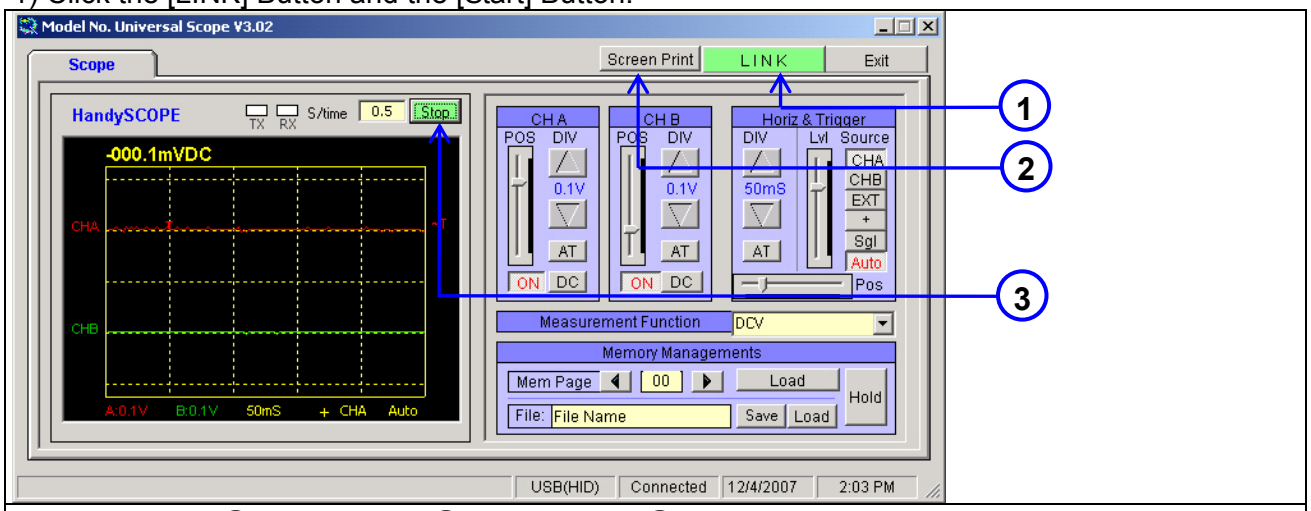
1) For using USB port your PC should have USB port. Connect USB cable to HandyScope at one end and to PC at other end.
2) Turn the HandyScope on.
3) **Click** [Start→Programs→HandyScope→HandyScope]

The HandyScope window will pop up as below

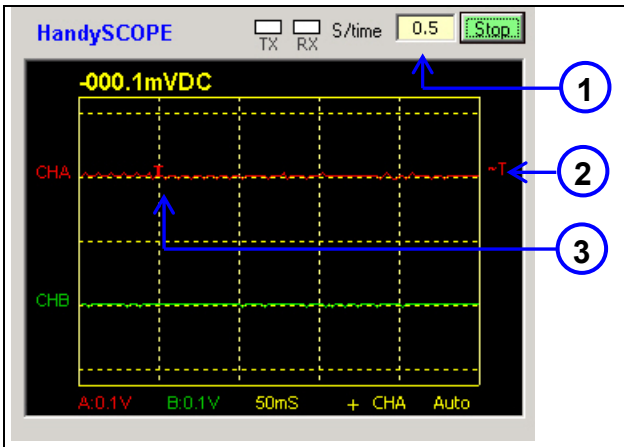


7.4.1. Oscilloscope Mode

1) Click the [LINK] Button and the [Start] Button.



①LINK Button, ②Screen Print, ③ Start / Stop Button for Oscilloscope

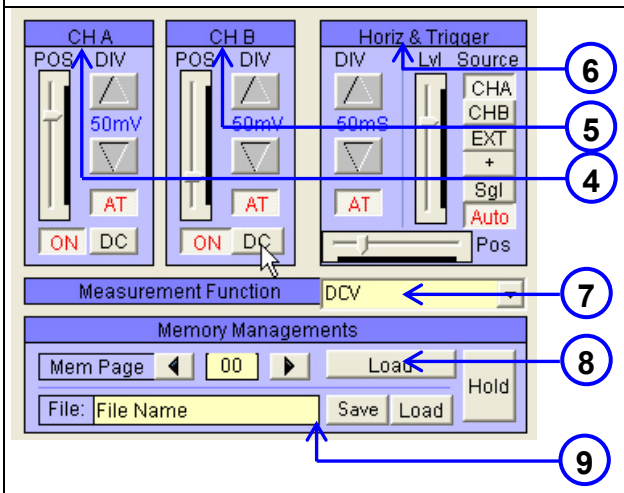


Display Area

① Sampling Time (0.001 to 9999)

② Trigger level indicator (-T)

③ Trigger point indicator (T)



Control Panel Area

④ Channel A (Vertical Position, Division, Auto, ON/Off and DC coupling)

⑤ Channel B (Vertical Position, Division, Auto, ON/Off and DC coupling)

⑥ Horizontal Division and Trigger (Horizontal Division, Auto, Trigger Level, Source and Position)

⑦ Measurement Function (DCV, ACV, OHM, BZ, Hz, RPM, Pulse Width and Duty)

⑧ Recalling Screens from Memory

⑨ Storing and Recalling Screens from PC Data

8. Maintaining the test tool

⚠ **Warning!**

- This section is very important for safety. Read and understand the following instruction fully and maintain your instrument properly.
- The instrument must be calibrated and inspected at least once a year to maintain the safety and accuracy.

8.1. About this Chapter

This chapter covers basic maintenance procedures that can be performed by the user and provides handling, cleaning, battery replacement, disassembly, and assembly instructions.

8.2. Static Safe Handling

Observe the following rules for handling static-sensitive devices:

1. Handle all static-sensitive components at a static-safe work area.
   Use grounded static control table mats on all repair meters, and always wear a grounded wrist strap. Handle boards by their nonconductive edges only. Store plastic, vinyl, and Styrofoam objects outside the work area.
2. Store and transport all static-sensitive components and assemblies in static shielding bags or containers. Static shielding bags and containers protect components and assemblies from direct static discharge and external static fields. Store components in their original packages until they are ready for use.

8.3. Cleaning the Meter

⚠ **Warning!**

To avoid electrical shock or damage to the meter, never allow water inside the case. To avoid damaging the meter's housing, never apply solvents to the meter.

If the meter requires cleaning, wipe it down with a cloth that is lightly dampened with water or a mild detergent. Do not use aromatic hydrocarbons, chlorinated solvents, or methanol-based fluids when wiping the meter.

8.4. Storing the Meter

If you are storing the Meter for an extended period of time, charge the LI-ION battery pack before storing. It is not necessary to remove the battery pack.

8.5. Calibration

The manufacturer may conduct the calibration and inspection. For more information, please contact the manufacturer.

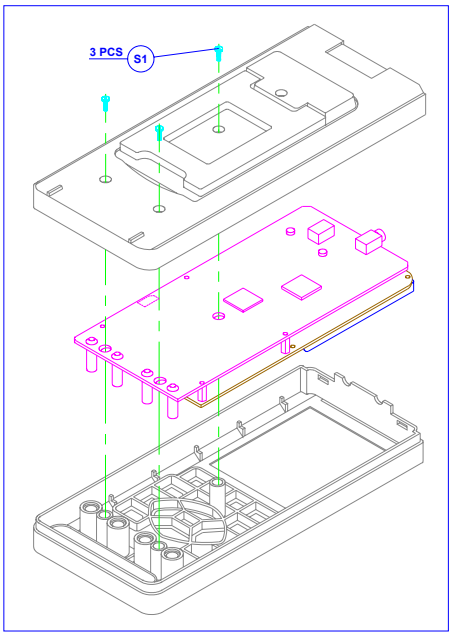
8.6. Replacing and Disposing of the Li-ION Battery

⚠ **Warning!**
To avoid electrical shock, remove the test leads and probes before replacing the battery pack.

⚠ **Caution**
Handle the PCB Assembly by its edges or while wearing gloves; avoid contaminating the PCB Assembly with oil from tour fingers.
A contaminated PCB Assembly may not cause immediate instrument failure in controlled environments. Failures typically show up when contaminated units are operated in humid areas.

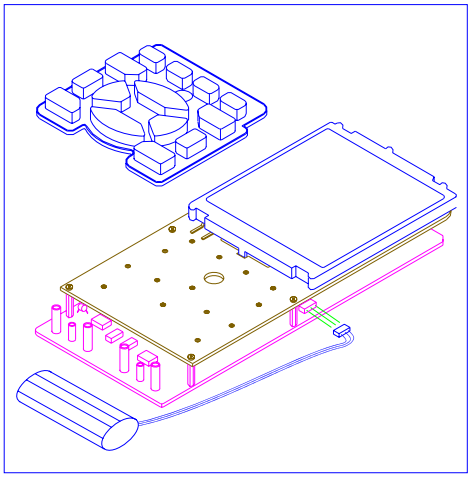
Note
This instrument contains a LI-ION battery pack. Do not dispose of this battery pack with other solid waste. Used batteries should be disposed of by a qualified recycler or hazardous materials handler.

To replace the battery pack
1. Remove the Meter Case



Use the following procedure to remove the meter case.
① Release the test leads
Disconnect the test leads and probes both at the source and at the meter.
② Power OFF
Make sure the meter is turned off and unplugged from the power Adaptor.
③ Remove Screw:
Remove the three screw from the bottom of the case. (3 pcs)
④ Remove the PCB Assembly:
Now remove the PCB Assembly by releasing the four snap retainers securing it to the case.

2. Remove Rubber key and Battery Pack



Rotate the PCB Assembly 180 degrees.

① Remove Rubber Key:

② Remove Battery Pack:
Remove the battery plug from the connector.

3. Install a new battery pack.
4. Reinstall the rear cover and secure the screws.

9. Appendices

9.1. Troubleshooting guide

If you experience trouble with your instrument, try these corrective actions before concluding that the instrument needs repair.

1. Make sure you are using fresh Li-ion battery or fully charged rechargeable battery pack. If you are using the AC/DC power adapter, make sure the adapter is plugged into an appropriate live power source.

2. If the buttons do not respond to your control or the contrast is set such that the display is unreadable, remove the power source while the instrument is on. Wait 15 minutes and then restore power and try operations.

3. If you still experience difficulty, check your connections and reread the usage instructions.

4. If meter is frozen while you control the trigger level:

   If you set the trigger level to normal (NOR) mode, trigger level must be the same level of waveform. Meter does not trigger if trigger level set above or below waveform.

   If you set the trigger level to Auto (AT) mode, you do not need to control the trigger level.

   In rare cases, your instrument may require servicing. There are no user-serviceable parts inside the instrument. For service, return the instrument to your customer service center.

MEMO

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Protek:
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